Exhibit A

Proposed Brief of Economists Supporting Dr. Rysman's "Variety" Model as [Proposed] Amici Curiae

Related to: Motion for Leave To File Brief of Economists as Amici Curiae in Support of Plaintiffs' Opposition to Defendant's Motion To Exclude Merits Opinions of Drr. Marc Rysman.

DAVID C. DINIELLI (CA Bar No. 177904)
Tech Accountability & Competition Project,
a division of the MFIA Clinic
Yale Law School
127 Wall Street
New Haven, CT 06511
David.Dinielli@yale.edu
Counsel for Economists Supporting Dr. Rysman's Variety Model as Amici Curiae

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

IN RE GOOGLE PLAY STORE ANTITRUST LITIGATION

THIS DOCUMENT RELATES TO:

State of Utah et al. v. Google LLC et al., Case No. 3:21-cv-05227-JD

In re Google Play Store Antitrust Litig., Case No. 3:21-md-02981-JD

In re Google Play Consumer Antitrust Litig., Case No. 3:20-cv-05761-JD

Case No. 3:21-md-02981-JD

[PROPOSED] BRIEF OF ECONOMISTS SUPPORTING DR. RYSMAN'S "VARIETY" MODEL AS *AMICI CURIAE* IN SUPPORT OF STATES' AND CONSUMERS' OPPOSITION TO DEFENDANTS' MOTION TO EXCLUDE MERITS OPINIONS OF DR. MARC RYSMAN

Judge: Hon. James Donato

I. INTRODUCTION AND INTERESTS OF *AMICI*[1]

Proposed *amici* are three renowned economists: Steven Berry, Ariél Pakes, and Katja Seim. Throughout their careers, each has demonstrated deep commitment to understanding competition and to the ongoing project of developing and updating economic tools that push forward the analysis underpinning effective antitrust enforcement. *Amici's* commitment is revealed in their scholarship, teaching, and government service. In particular, *amici* are key contributors to the literature providing the theoretical foundation for many of the economic tools that power modern antitrust enforcement. This research, and the research that builds on it, regularly influences rulings and outcomes in antitrust cases.[2] Successful antitrust analysis relies on economic tools to reveal how markets function, identify conduct likely to generate anticompetitive effects, and measure the harms attributable to lost competition, among other things.

Economic models are perhaps the most important of these tools. A model is, as Google disparagingly asserts, an "abstraction." Google uses the word "abstraction" pejoratively as if that characteristic is a sufficient reason for exclusion. This is false. Economists understand that models are abstractions both by design and by necessity. *By design*, models present abstractions of real-life, dynamic systems in that they identify and isolate the key mechanisms by which the major elements in the system affect one another, while ignoring those with less impact on the outcomes being studied. And *by necessity*, a model provides an abstraction of the counterfactual world because it is not possible to predict in detail and with certainty outcomes in markets we can never observe.[3] The simplicity is why model can be used to learn how that system would behave under counterfactual conditions.

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[1] No party's counsel authored this brief in whole or in part and no person contributed money intended to fund its preparation or submission. *Cf.* Fed. R. App. P. 29(a)(4)(E). Nothing in this brief or the motion for leave to file it represents the views of the Yale Law School or Yale University, if any,

[2] Additional information about each economist can be found in an Appendix X, which appears on the page after the signature block.

[3] To abstract (v.) is "to make a summary or abstract of"; an abstract (n.) in turn, is "something that summarizes or concentrates the essential elements of a larger thing." To abstract (v.) also is to

Amici have an interest in the motion to exclude Dr. Rysman's testimony. A ruling crediting Google's two, core critiques—that the variety model is a mere "abstraction" and that innovation harms aren't the proper subjects of modeling in any event—could undermine the use of economic models generally and spell the end for models that identify or quantify innovation harms in particular.

Google complains that the variety model relies on assumptions that ignore various complexities and conflict with certain market facts. But that critique alone cannot justify exclusion. *All* model-based testimony would then be at risk of exclusion, because *all* models use assumptions that describe reality only imperfectly. Moreover, all antitrust cases require a comparison of the features and outputs of a real, operating market to the features and outputs we predict the market would generate were it operating under counterfactual conditions. This thought experiment requires a model, else courts will have nothing to base their predictions on but hunch, intuition, or even implicit bias.

The use of models in antitrust to predict the counterfactual is therefore well established. Moreover, the economic literature has for decades confirmed that the tools and methods economists use to build models for antitrust cases—including assumptions that simplify the complexity of real-life markets by abstracting only their key features—produce reliable results. Excluding economic models because they are "abstractions" would upend all of this.

As strong proponents of models and their use in antitrust, we defend Dr. Rysman's model against Google's grab bag of grievances, in addition to defending it against the core grievances. We focus on those grievances that are economic in nature at least in part and that relate to economic models of choice, innovation, and variety.

"consider apart from application to or association with a particular instance," and something may properly be described as abstract (adj.) if it is "disassociated from any specific instance." *See* Abstract, MERRIAM-WEBSTER DICTIONARY, https://www.merriam-webster.com/dictionary/abstract. Together, these definitions suggest an *abstraction* should be understood as a representation that gives attention and prominence to a thing's essential elements while isolating those elements from surrounding noise and distracting complexity.

II. ARGUMENT

A. Innovation increases welfare by driving quality and variety improvements; reducing it shrinks welfare, causing economic harm to consumers; innovation harms are therefore a proper subject of modeling.

Google's motion, taken as a whole, portrays the harms attributable to reduced innovation as trifling and unworthy of serious attention or modeling. Google is well out of bounds with this position, however. Economics has long recognized the connection between innovation and welfare, and the increasing digitization of consumer goods and services will only elevate the importance of innovation-based competition relative to competition based on price. It therefore is important to develop models that explain and quantify innovation's effects on welfare in particular markets.

(1) The connection between innovation and welfare is long established.

For more than half a century, economists have recognized that innovation, in product quality and variety, drives productivity growth and raises living standards. Robert Solow won a Nobel Prize for his decades-long contribution to the study of innovation and its importance to productivity, economic growth, and consumption.[4] Professor Solow's empirical research and that of hundreds of subsequent empirical researchers confirms the tremendous impact of innovation on consumer welfare.[5]

Firms innovate to win customers; they do this because customers value quality improvements and variety. Innovation-based competition takes on special significance in digital markets in which so many digital products and services are sold for a non-cash price (sometimes erroneously described as "free"). Innovation-based competition is not new, of course; it predates the rise of modern digital platforms in familiar products such as broadcast TV and terrestrial radio.

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[4] Royal Swedish Academy of Sciences, Press Release: The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel:1987, https://www.nobelprize.org/prizes/economic-sciences/1987/summary/

[5] Kevin A. Bryan, Heidi L. Williams, Innovation: Market Failures and Public Policies, Editors: Kate Ho, Ali Hortaçsu, Alessandro Lizzeri, Handbook of Industrial Organization, Elsevier, Volume 5, Issue 1, 2021, Pages 281-388, ISSN 1573-448X, ISBN 9780323988872, https://doi.org/10.1016/bs.hesind.2021.11.013.

Given the bedrock economic truth that competition often manifests through innovation and its consequent improvements in quality and variety, it is not surprising that courts regularly acknowledge innovation as a dimension of competition.[6] Consider how innovation spurred by the competition between rival suppliers has produced new medical treatments, better seeds, more powerful semiconductor chips, safer cars, and countless other products we enjoy every day. That these improvements in choice and quality contribute massively to welfare is obvious. It also is obvious, and unquestioned in the modern literature, that a reduction in innovation reduces welfare. Given the robust body of evidence of the value of innovation, it is incumbent on enforcers and courts to consider the impact of conduct in particular cases on innovation. A blind spot for innovation impacts risk subjecting consumers, and all of society, to significant welfare losses. Economic models that help identify and quantify innovation harms are therefore vital.

(2) Innovation harms (including reduced quality or variety) are economic harms.

Google argues that the variety model is irrelevant to the proceedings because it measures only emotional harm that is neither cognizable nor compensable under the Clayton Act. We are not experts in what the Clayton Act requires as proof of injury and damage. But to the extent Google's argument depends in any way on the assertion that lost innovation causes only noneconomic harm, or on the assertion that the variety model described in Dr. Rysman's expert report (putting to the side for now how anyone may have described it in deposition) predicts only emotional harm, we flatly reject it because both assertions are inarguably wrong.

there simply is no dispute among economists that innovation contributes to consumers' *economic* welfare and that suppressing it lowers quality and decreases variety, which reduces welfare and imposes economic harm. We continue to develop methods for measuring and predicting the *magnitude*

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[6] See States' Opposition to Motion To Exclude Merits Opinions of Dr. Rysman (Dkt. 512) at 11-12 (collecting cases); *see also id.* at 12 (citing Horizontal Merger Guidelines).

of innovation harms. This project is far from simple, though consensus principles informing it all assume or confirm the economic nature of the harms at issue. Economic tools can clearly demonstrate how lessened innovation is an economic harm, just as a higher price is. In a typical price harm, the demand curve stays fixed but the price increases, shrinking consumer surplus. Innovation affects consumer surplus differently, but no less directly. Improved products raise the demand curve because products create more value for users, thereby expanding the size of the area of surplus. Constraints on innovation do the opposite, shifting the demand curve down and shrinking that surplus. The takeaway here is that a higher price or lessened innovation both hurt consumers. It is not the case that price increases shrink surplus whereas lost innovation harms hurt feelings. Rather, each can be shown within the same model because they are both economic losses.

Economists measure consumer welfare using a metric called "utility," a term of art that accounts for all product characteristics a consumer values. "Happiness" is not a term of art in economics, but, by analogy, can help explain utility to non-economists. This is because happiness, like utility, also can be understood as a measure affected by the influence of a broad range of factors that can include financial health, reliability of tools confer various forms of benefits. The variety model predicts the *utility* of the set of apps that would have been released but for Google's conduct, the loss of which serves as proxy for lost welfare. Under questioning, Dr. Rysman agreed that, because happiness and utility are analogous, one way to understand the variety model is as an attempt to predict lost happiness. In context, it is clear Dr. Rysman agreed that his model predicts happiness in the broad sense, a sense that includes outcomes like financial well-being and the functionality and attributes of physical possessions. Reducing that sort of happiness plainly results in more than just hurt feelings. Second, the model may predict emotional harm, but mainly predicts economic harm, as can be seen by the factors it includes and measures.

B. Economic models strip away complexities to reveal how elements in complex systems interact; none is perfect; new markets demand new models.

(1) All models are abstractions that that we seek constantly to improve.

As noted above, a model is designed to be an abstraction. Use of a model is best practice and necessary for an economist to achieve a reliable answer to any question that requires knowing the impact of counterfactual conduct. As the discipline progresses, our models and counterfactuals have gotten better. Models that enabled counterfactual predictions of price were the first to be invented because that setting is somewhat simpler than innovation. Subsequent work has been done on analogous models of entry, innovation, and product variety.[7] More detailed demand models have been used in many legal proceedings and vertical models have been used extensively to evaluate the impacts of mergers in vertical markets.[8] Modeling the impact of conduct or market structure on either R&D expenditures or the resulting new products requires incorporating the forward-looking behavior of firms.[9]

The economic literature contains long-established and robust ways of modeling the way innovation benefits end consumers. Essentially, when a consumer makes a choice to consume a particular product, he or she is choosing from among options that have different qualities, features, novelty, and prices. If one available choice incorporates a new innovation that consumers like, that product will gain sales and market share. The consumers who choose it are better off, as evidenced by the fact that they moved away from a choice that had previously offered the most utility. Of course, there may be minor features of products that increase consumer utility very little, as well as major ones

[7] *See, e.g.*, Katja Seim, et al., *The Welfare Consequences of Mergers with Product Repositioning*, 66 Journal of Industrial Economics (2018); Katja Seim et al., *Quantifying the Benefits of Entry into Local Phone Service*, 38 RAND Journal of Economics (2008).

[8] E.g., Steven C. Solop, Invigorating Vertical Merger Enforcement, 127 Yale L.J. 1742 (2018) (arguing improvements in modeling has lent certainty to settings that currently were not amenable to valid predictions).

[9] E.g., Chaim Fershtman & Ariel Pakes, *Dynamic Games with Asymmetric Information: A Framework for Empirical Work*, the Quarterly Journal of Economics 1 (2012).

that increase consumer welfare significantly. In general, innovation that generates products consumers want to buy naturally increases consumer welfare.

(2) Modern techniques allow for the quantitative estimation of parameters in models of innovation

More recently, economists have developed estimation methods for these models that allow researchers to quantify how much consumers benefit from particular innovations and features. An innovation model is guided by the behavior of consumers; when consumers value an innovation, they purchase it instead of a less innovative product. The innovation could be technology or something as simple as a new location near the consumer, or a new combination of existing features that appeals to consumer tastes. By measuring which products are chosen, the econometrician can back out which attributes are valued by consumers, and how different customers value attributes differently.
The estimated parameters can be used to quantify outcomes in a counterfactual setting that cannot be measured directly. The first powerful economic models that allowed for counterfactual studies of price tackled demand estimation. The next generation of modeling showed how to handle differentiated products, a common type of competition in the economy.[10]

These models (often referred to as "BLP" due to the seminal article) are used extensively in merger analysis because they allow the impact of the merger on price to be simulated. Another branch of the literature models consumer benefits from the introduction of innovations and the incentives of firms to enter.[11] Estimation followed by scholars such as Ariel Pakes, Matthew Gentzkow, and Joel Waldfogel who studied consumer choice but allowed entry in markets such as newspapers, telecommunication equipment, songs, and apps.[12] This work and others shows that there are a series of

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[10] *See* Berry, Steven, "Estimating Discrete Choice Models of Product Differentiation," RAND Journal of Economics, Summer 1994, 23 (2), 242–262.
[11] *See* Goolsbee and Petrin "The Consumer Gains from Direct Broadcast Satellites and the Competition with Cable Television" Econometrica 72(2), March 2004, 351-381.
[12] Competition and Ideological Diversity: Historical Evidence from US Newspapers" (with Jesse M. Shapiro and Michael Sinkinson). American Economic Review. 104(10). October 2014.

increasingly sophisticated ways of measuring the impacts of increased variety and quality on consumer welfare in particular industries.[13] In light of the extensive and well-known economic literature that has developed in this area, the variety model is reasonable and reliable.

III. CONCLUSION

We have explained that abstract modeling is an essential tool for an economist and such modeling requires assumptions and factual inputs. Models will never be crafted to include each individual data point. Averages and simplifying assumptions render the empirical problem tractable and plausible. Despite their abstraction, they may be a good approximation of the damage estimate needed. A model's assumptions can be tested against data for their validity and such analyses presented in court.[14]

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Respectfully submitted,

By:____________________________

DAVID C. DINIELLI (CA Bar No. 177904)
Tech Accountability & Competition Project,
a division of the MFIA Clinic

Counsel for Economists Supporting Dr. Rysman's Variety Model as Amici Curiae

[13] These range from obtaining bounds on the gains to quality and variety, to more sophisticated models which provide direct measures of gains in consumer welfare. For example, a lower bound to the gains from the increasing variety can be obtained from the value of the time spent by consumers on the products in addition to the purchase price. For an example see "Internet Rising, Prices Falling: Measuring Inflation in a World of e-Commerce," (Goolsbee and Peter Klenow), AEA Papers and Proceedings, May 2018, 108: 488–492.

[14] See the reviews by Doraszelski U, Pakes A. A Framework for Applied Dynamic Analysis in IO. In: Armstrong M, Porter R The Handbook of Industrial Organization. Vol. 3, New York: Elsevier ; 2007. pp. Chapter 33 2183-2162 and Dynamic Games in Empirical Industrial Organization, Victor Aguirregabiria, Allan Collard-Wexler and Stephen Ryan, forthcoming in the Handbook of Industrial Organization (September 2021).

Appendix A

Steven Berry is the David Swensen Professor of Economics and Jeffrey Talpins Faculty Director of the Tobin Center for Economic Policy at Yale University. He specializes in the empirical analysis of markets in equilibrium and the dynamic analysis of industries, is a winner of the Frisch Medal of the Econometric Society and is an elected member of the American Academy of Arts and Sciences.

Ariél Pakes is the Thomas Professor of Economics at Harvard University. He has developed wide ranging tools and models used by government agencies and others to explain how dynamic systems respond to environmental and input changes and has won the Nemmers Prize in Economics for his "fundamental contributions" to the empirical study of market power, prices, mergers, and productivity.

Katja Seim is the Sharon Oster Professor of Economics and Management at Yale University with joint appointments in the School of Management and the Department of Economics. She studies firms' responses to competition policy and the interplay between market power and the outcomes of government auctions, was chief economist at the Federal Communications Commission, and is co-editor of the American Economic Review.

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I, David C. Dinielli, am the ECF User whose ID and password are being used to file this document. In compliance with Civil Local Rule 5-1(h)(3), I hereby attest that each of the signatories identified above has concurred in this filing.

By: ______________________________

DAVID C. DINIELLI (CA Bar No. 177904)
Tech Accountability & Competition Project,
a division of the MFIA Clinic

Counsel for Economists Supporting Dr. Rysman's Variety Model as Amici Curiae